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## Product Summary

| Device | $V_{(BR)DSS}$ | $R_{DS(ON)}$ max                       | $I_D$ max<br>$T_A = +25^\circ\text{C}$ |
|--------|---------------|--|--|
| Q1     | 30V           | 27m $\Omega$ @ $V_{GS} = 10\text{V}$   | 7.2A                                   |
|        |               | 35m $\Omega$ @ $V_{GS} = 4.5\text{V}$  | 6.0A                                   |
| Q2     | -30V          | 25m $\Omega$ @ $V_{GS} = -10\text{V}$  | -7.6A                                  |
|        |               | 41m $\Omega$ @ $V_{GS} = -4.5\text{V}$ | -6.2A                                  |

## Description

This new generation MOSFET is designed to minimize the on-state resistance ( $R_{DS(ON)}$ ) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

## Applications

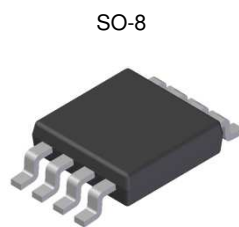
- DC-DC Converters
- Power Management Functions
- Backlighting

## Features and Benefits

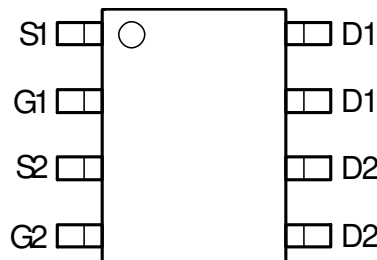
- Low Input Capacitance
- Low On-Resistance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

## Mechanical Data

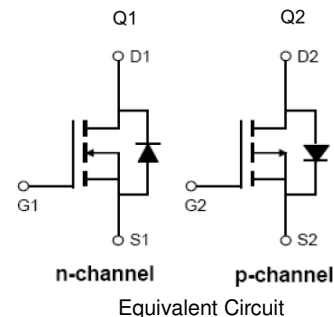
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Tin Finish Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208③
- Weight: 0.074 grams (Approximate)



Top View



Top View  
Pin Configuration

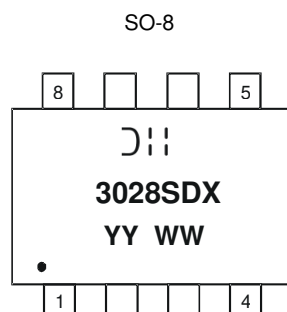


## Ordering Information (Note 5)

| Part Number     | Case | Packaging         |
|-----------------|------|-------------------|
| DMC3028LSDXQ-13 | SO-8 | 2,500/Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to [http://www.diodes.com/quality/product\\_grade\\_definitions/](http://www.diodes.com/quality/product_grade_definitions/).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



3028SDX = Manufacturer's Marking  
 3028SDX = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Year (ex: 13 = 2013)  
 WW = Week (01 - 53)

**Maximum Ratings – Q1 and Q2** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic  |              |  | Symbol           | Q1         | Q2           | Units |
|---|--------------|--|------------------|------------|--------------|-------|
| Drain-Source Voltage                                    |              |  | V <sub>DSS</sub> | 30         | -30          | V     |
| Gate-Source Voltage                                     |              |  | V <sub>GSS</sub> | ±20        | ±20          | V     |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | 5.5<br>4.1 | -5.8<br>-4.3 | A     |
|   | t < 10s      | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | 7.2<br>5.7 | -7.6<br>-6.1 | A     |
| Maximum Body Diode Forward Current (Note 6)             |              |  | I <sub>S</sub>   | 2.2        | -2.2         | A     |
| Pulsed Drain Current (10μs pulse, duty cycle = 1%)      |              |  | I <sub>DM</sub>  | 40         | -30          | A     |

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                   |                        | Symbol                            | Value       | Units |
|--|------------------------|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 6)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 1.2         | W     |
|  | T <sub>A</sub> = +70°C |                                   | 0.75        |       |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State           | R <sub>θJA</sub>                  | 108         | °C/W  |
|  | t < 10s                |                                   | 65          |       |
| Total Power Dissipation (Note 7)                 | T <sub>A</sub> = +25°C | P <sub>D</sub>                    | 1.5         | W     |
|  | T <sub>A</sub> = +70°C |                                   | 0.95        |       |
| Thermal Resistance, Junction to Ambient (Note 7) | Steady State           | R <sub>θJA</sub>                  | 85          | °C/W  |
|  | t < 10s                |                                   | 50          |       |
| Thermal Resistance, Junction to Case (Note 7)    |                        | R <sub>θJC</sub>                  | 14.5        |       |
| Operating and Storage Temperature Range          |                        | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C    |

**Electrical Characteristics – Q1** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                             | Symbol              | Min | Typ  | Max  | Unit | Test Condition  |
|--|---------------------|-----|------|------|------|---|
| <b>OFF CHARACTERISTICS (Note 8)</b>        |                     |     |      |      |      |   |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>   | 30  | —    | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA  |
| Zero Gate Voltage Drain Current            | I <sub>DSS</sub>    | —   | —    | 1    | μA   | V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V   |
| Gate-Source Leakage                        | I <sub>GSS</sub>    | —   | —    | ±100 | nA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V  |
| <b>ON CHARACTERISTICS (Note 8)</b>         |                     |     |      |      |      |   |
| Gate Threshold Voltage                     | V <sub>GS(th)</sub> | 1   | —    | 3    | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                |
| Static Drain-Source On-Resistance          | R <sub>DS(on)</sub> | —   | 19   | 27   | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 6A  |
|  |                     | —   | 22   | 35   |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 5A   |
| Diode Forward Voltage                      | V <sub>SD</sub>     | —   | 0.7  | 1.2  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 1.3A   |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b>    |                     |     |      |      |      |   |
| Input Capacitance                          | C <sub>iss</sub>    | —   | 641  | —    | pF   | V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V<br>f = 1.0MHz                                 |
| Output Capacitance                         | C <sub>oss</sub>    | —   | 66   | —    |      |   |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    | —   | 51   | —    |      |   |
| Gate Resistance                            | R <sub>G</sub>      | —   | 2.2  | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz                                    |
| Total Gate Charge (V <sub>GS</sub> = 4.5V) | Q <sub>g</sub>      | —   | 6    | —    | nC   | V <sub>DS</sub> = 15V, I <sub>D</sub> = 10A   |
| Total Gate Charge (V <sub>GS</sub> = 10V)  | Q <sub>g</sub>      | —   | 13.2 | —    |      |   |
| Gate-Source Charge                         | Q <sub>gs</sub>     | —   | 1.7  | —    |      |   |
| Gate-Drain Charge                          | Q <sub>gd</sub>     | —   | 2.2  | —    |      |   |
| Turn-On Delay Time                         | t <sub>D(on)</sub>  | —   | 3.3  | —    | nS   | V <sub>GS</sub> = 10V, V <sub>DD</sub> = 15V, R <sub>G</sub> = 6Ω,<br>I <sub>D</sub> = 1A |
| Turn-On Rise Time                          | t <sub>r</sub>      | —   | 4.4  | —    |      |   |
| Turn-Off Delay Time                        | t <sub>D(off)</sub> | —   | 22.3 | —    |      |   |
| Turn-Off Fall Time                         | t <sub>f</sub>      | —   | 5.3  | —    |      |   |



**Electrical Characteristics – Q2** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                              | Symbol              | Min | Typ  | Max  | Unit | Test Condition   |
|---|---------------------|-----|------|------|------|--|
| <b>OFF CHARACTERISTICS (Note 8)</b>         |                     |     |      |      |      |  |
| Drain-Source Breakdown Voltage              | BV <sub>DSS</sub>   | -30 | —    | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA  |
| Zero Gate Voltage Drain Current             | I <sub>DSS</sub>    | —   | —    | -1   | μA   | V <sub>DS</sub> = -24V, V <sub>GS</sub> = 0V   |
| Gate-Source Leakage                         | I <sub>GSS</sub>    | —   | —    | ±100 | nA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V   |
| <b>ON CHARACTERISTICS (Note 8)</b>          |                     |     |      |      |      |  |
| Gate Threshold Voltage                      | V <sub>GS(th)</sub> | -1  | —    | -3   | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA                                    |
| Static Drain-Source On-Resistance           | R <sub>DS(ON)</sub> | —   | 21   | 25   | mΩ   | V <sub>GS</sub> = -10V, I <sub>D</sub> = -6A   |
|   |                     | —   | 29   | 41   |      | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -5A  |
| Diode Forward Voltage                       | V <sub>SD</sub>     | —   | -0.7 | -1.2 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = -1.3A   |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b>     |                     |     |      |      |      |  |
| Input Capacitance                           | C <sub>iss</sub>    | —   | 1241 | —    | pF   | V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V<br>f = 1.0MHz                                     |
| Output Capacitance                          | C <sub>oss</sub>    | —   | 146  | —    |      |  |
| Reverse Transfer Capacitance                | C <sub>rss</sub>    | —   | 110  | —    |      |  |
| Gate Resistance                             | R <sub>G</sub>      | —   | 14.8 | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz   |
| Total Gate Charge (V <sub>GS</sub> = -4.5V) | Q <sub>g</sub>      | —   | 10.9 | —    | nC   | V <sub>DS</sub> = -15V, I <sub>D</sub> = -7A   |
| Total Gate Charge (V <sub>GS</sub> = -10V)  | Q <sub>g</sub>      | —   | 22   | —    |      |  |
| Gate-Source Charge                          | Q <sub>gs</sub>     | —   | 3.5  | —    |      |  |
| Gate-Drain Charge                           | Q <sub>gd</sub>     | —   | 4.7  | —    |      |  |
| Turn-On Delay Time                          | t <sub>D(on)</sub>  | —   | 9.7  | —    | nS   | V <sub>GS</sub> = -10V, V <sub>DD</sub> = -15V, R <sub>GEN</sub> = 6Ω,<br>I <sub>D</sub> = -7A |
| Turn-On Rise Time                           | t <sub>r</sub>      | —   | 17.1 | —    |      |  |
| Turn-Off Delay Time                         | t <sub>D(off)</sub> | —   | 60.5 | —    |      |  |
| Turn-Off Fall Time                          | t <sub>f</sub>      | —   | 40.4 | —    |      |  |

- Notes:
6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  7. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  8. Short duration pulse test used to minimize self-heating effect.
  9. Guaranteed by design. Not subject to product testing.

# N-Channel – Q1

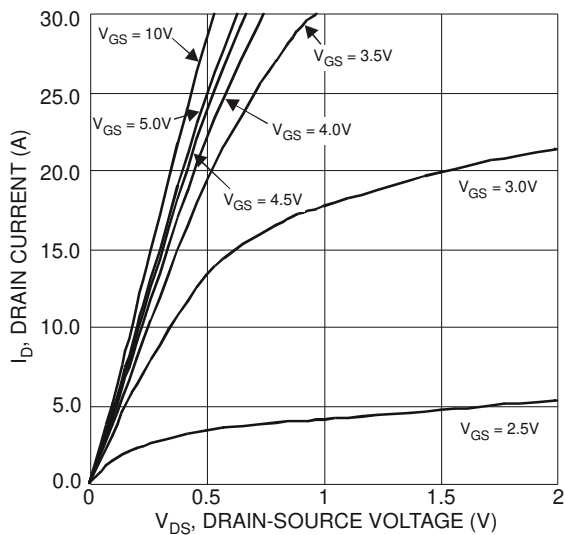


Figure 1 Typical Output Characteristic

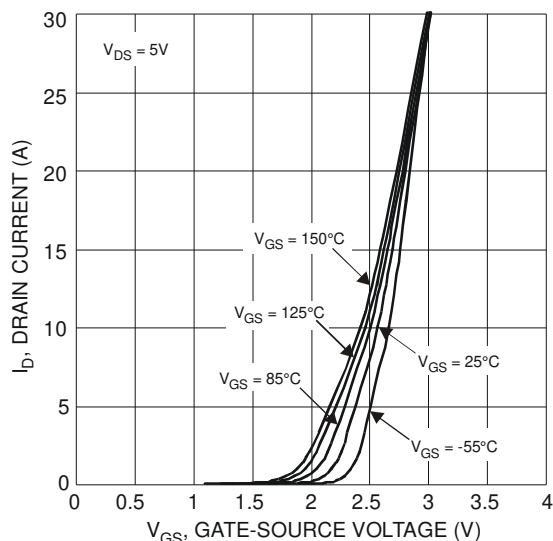


Figure 2 Typical Transfer Characteristic

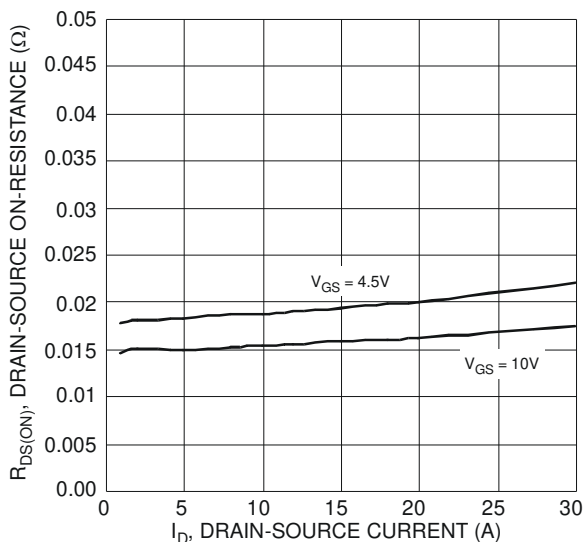


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

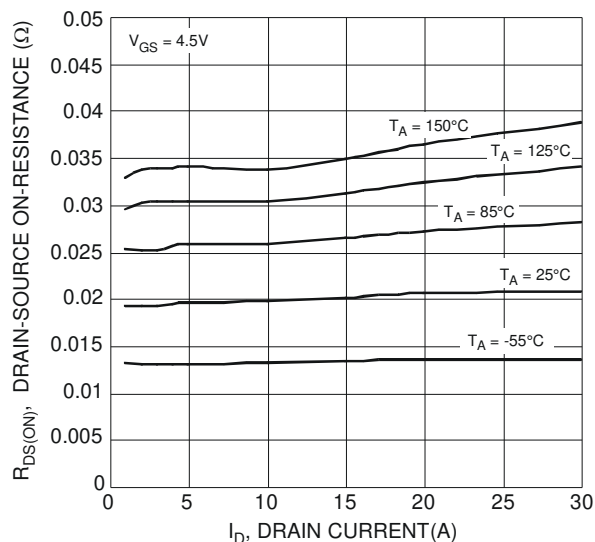


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

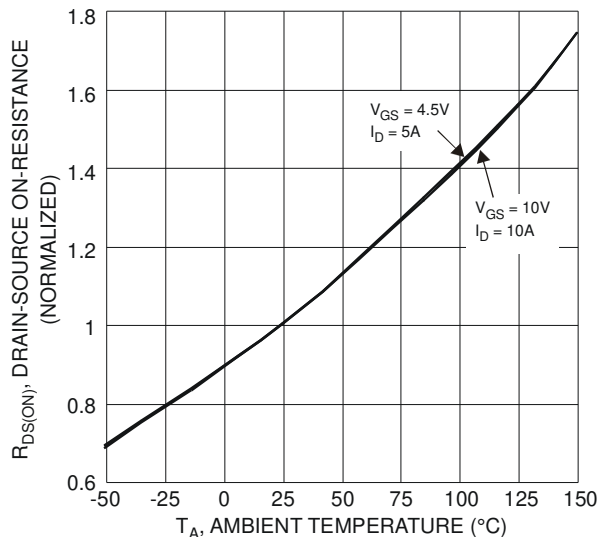


Figure 5 On-Resistance Variation with Temperature

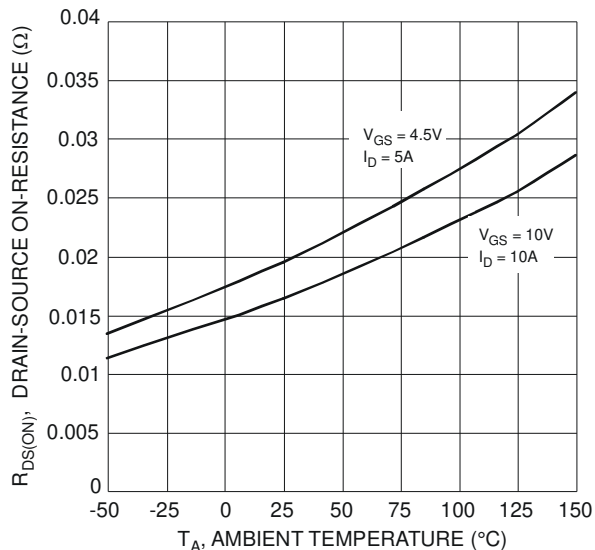


Figure 6 On-Resistance Variation with Temperature

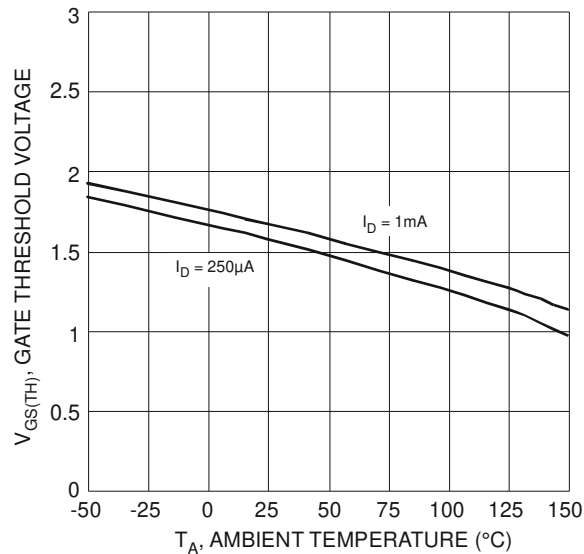


Figure 7 Gate Threshold Variation vs. Ambient Temperature

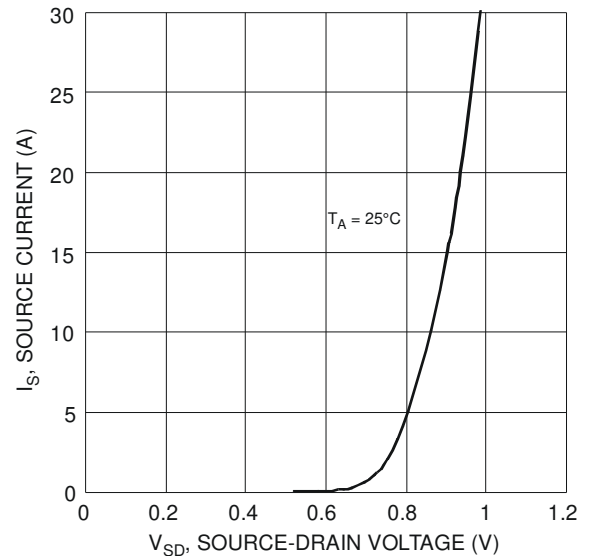


Figure 8 Diode Forward Voltage vs. Current

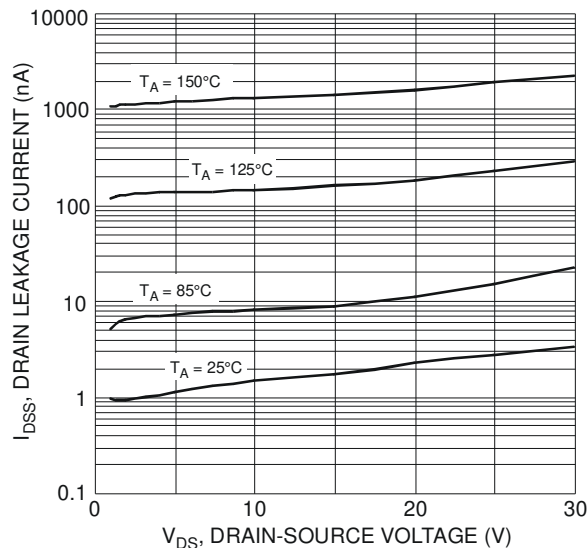


Figure 9 Typical Drain-Source Leakage Current vs. Voltage

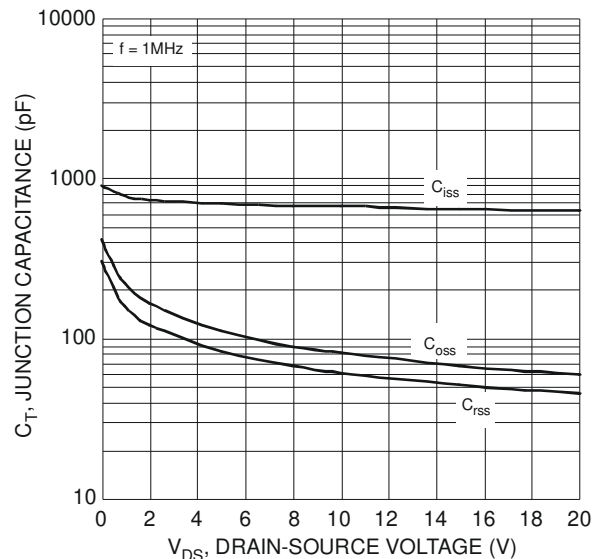


Figure 10 Typical Junction Capacitance

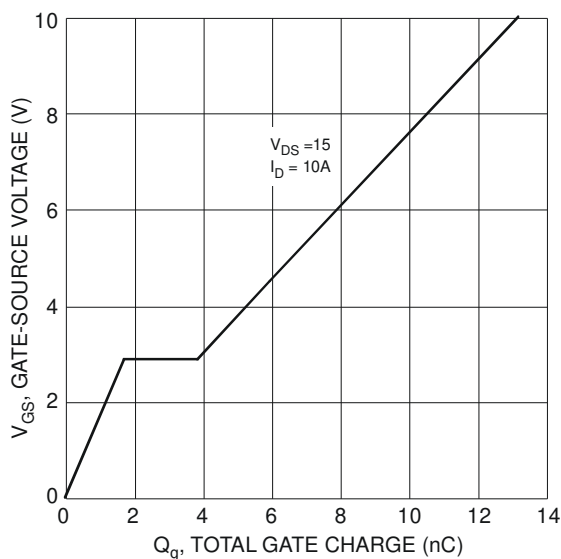


Figure 11 Gate-Source Voltage vs. Total Gate Charge

**P-Channel – Q2**

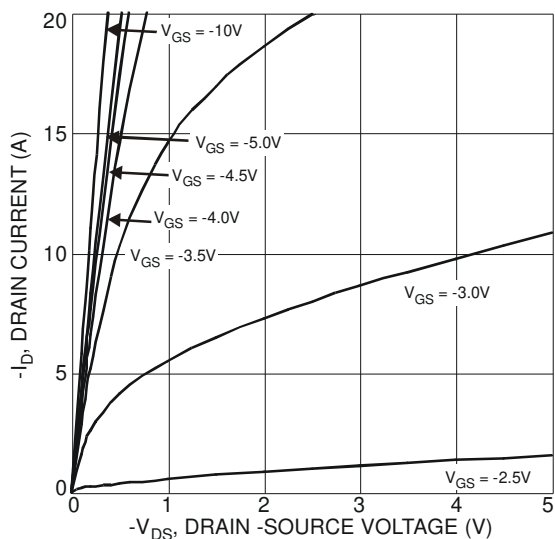


Figure 1 Typical Output Characteristics

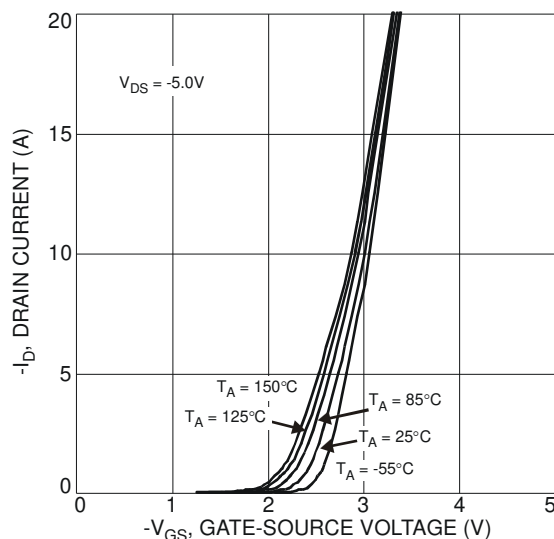


Figure 2 Typical Transfer Characteristics

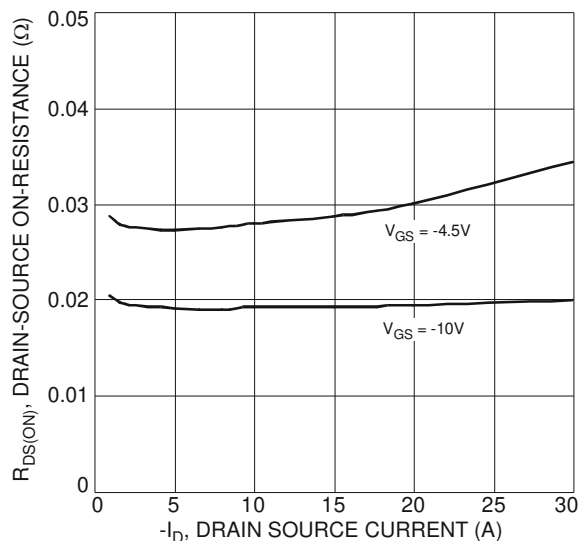


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

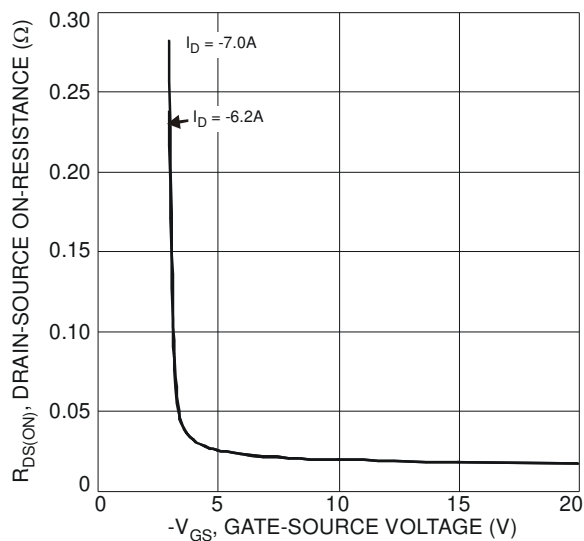


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

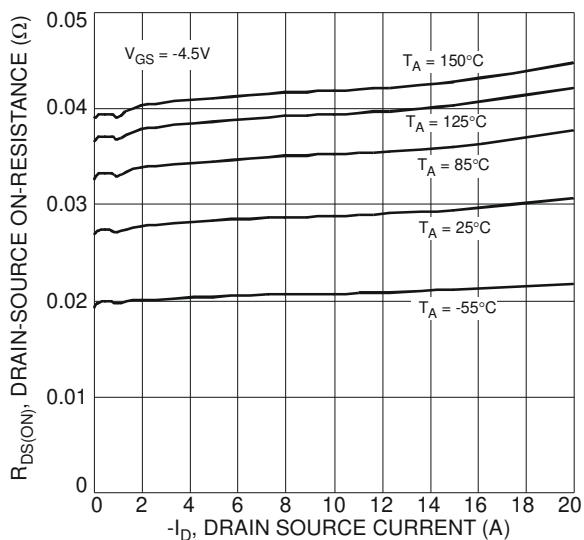


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

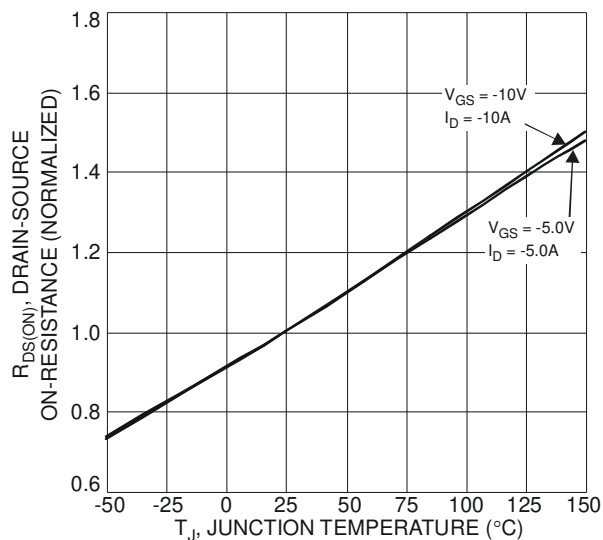


Figure 6 On-Resistance Variation with Temperature

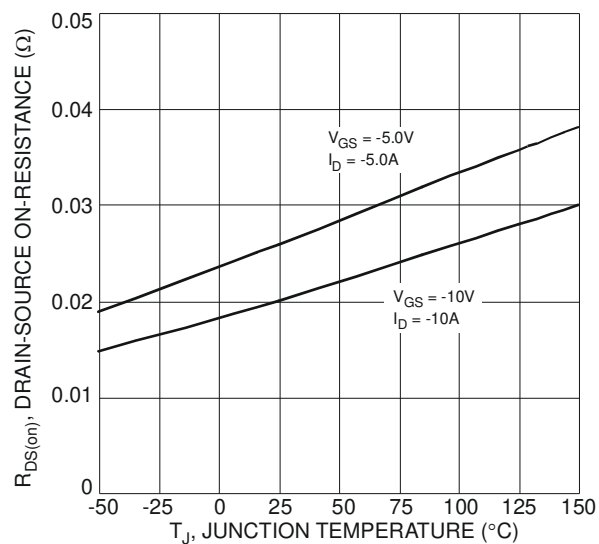


Figure 7 On-Resistance Variation with Temperature

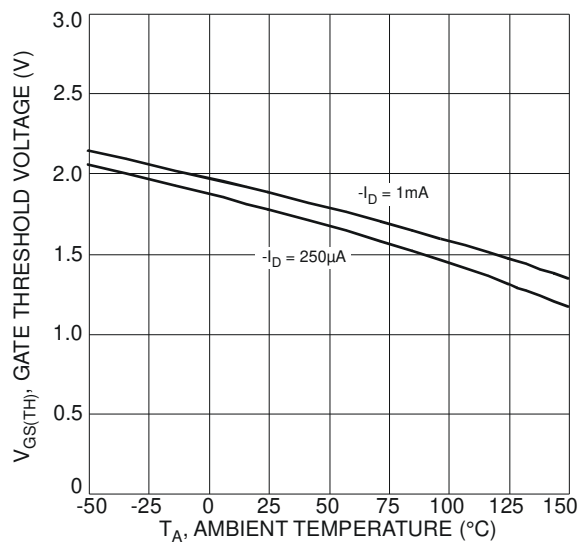


Figure 8 Gate Threshold Variation vs. Ambient Temperature

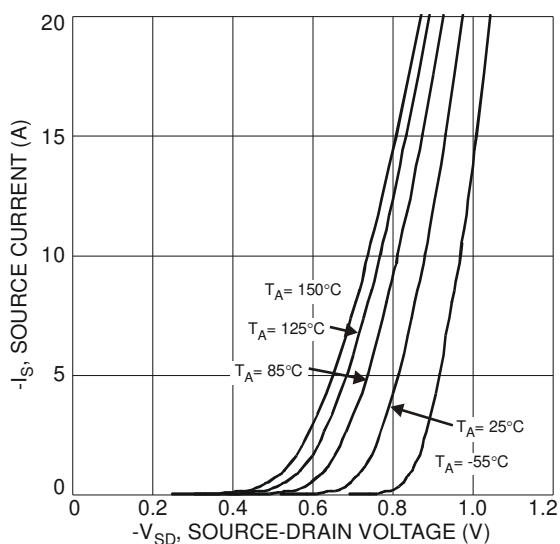
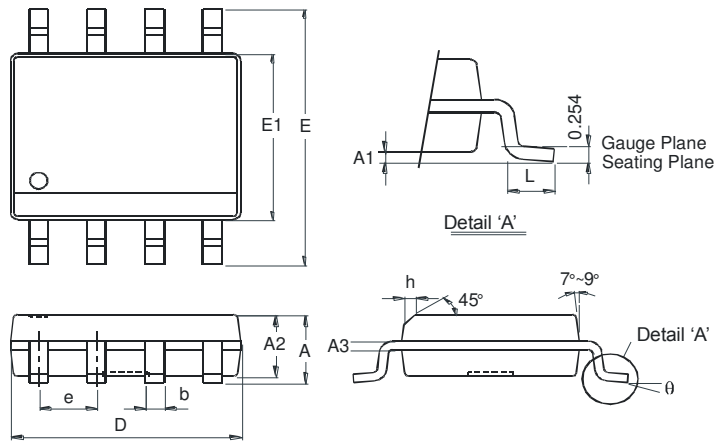


Figure 9 Diode Forward Voltage vs. Current



## Package Outline Dimensions

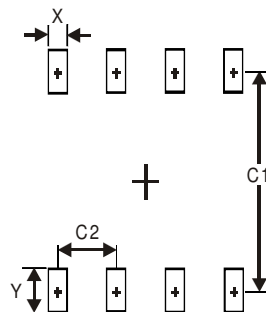
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| SO-8                 |          |      |
|----------------------|----------|------|
| Dim                  | Min      | Max  |
| A                    | -        | 1.75 |
| A1                   | 0.10     | 0.20 |
| A2                   | 1.30     | 1.50 |
| A3                   | 0.15     | 0.25 |
| b                    | 0.3      | 0.5  |
| D                    | 4.85     | 4.95 |
| E                    | 5.90     | 6.10 |
| E1                   | 3.85     | 3.95 |
| e                    | 1.27 Typ |      |
| h                    | -        | 0.35 |
| L                    | 0.62     | 0.82 |
| θ                    | 0°       | 8°   |
| All Dimensions in mm |          |      |

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| X          | 0.60          |
| Y          | 1.55          |
| C1         | 5.4           |
| C2         | 1.27          |

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